

# **Assessment of Water Quality in Kootenai River and Moyie River Subbasins (TMDL)**

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**Final Public Comment Draft**

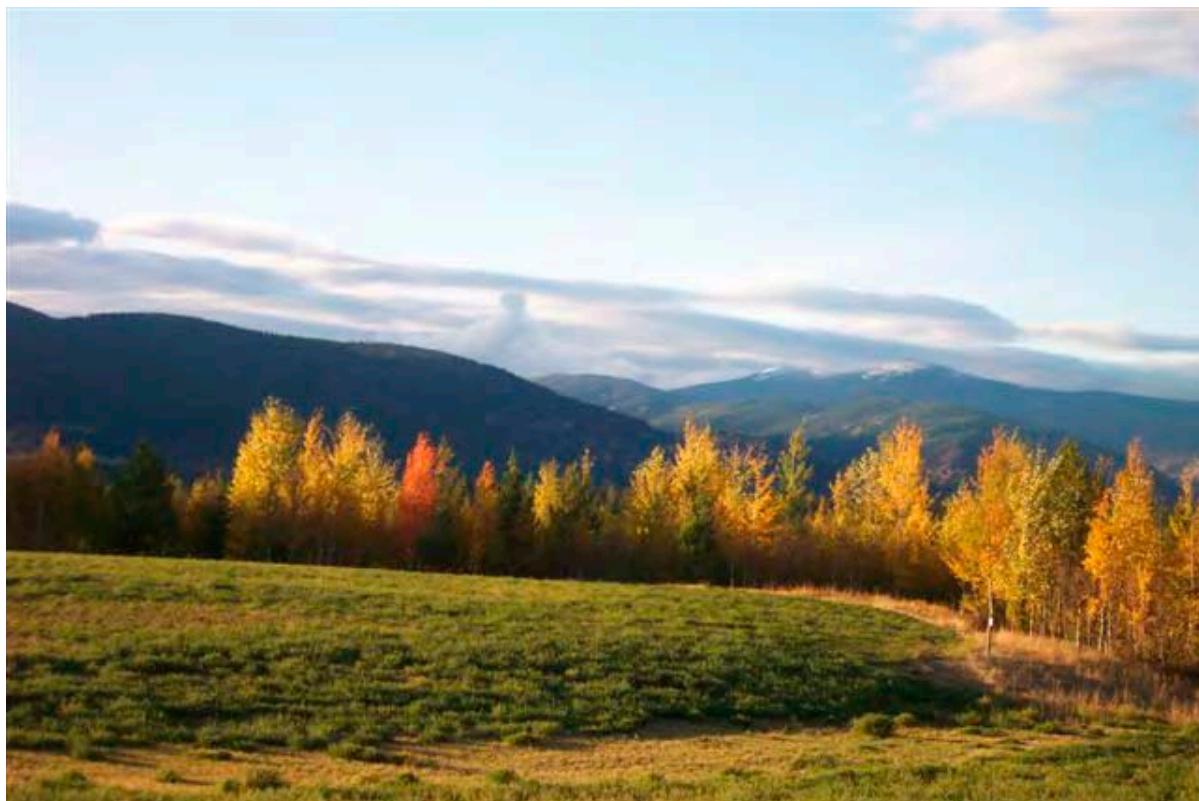


**Kootenai Tribe of Idaho  
Department of Environmental Quality  
United States Environmental Protection Agency**

**May 2006**

Cover Photo: Cover photograph of Kootenai River meandering through adjacent valley agriculture and Selkirk Mountains in the distance. Photo taken by Nadine Nystrom and provided by Patty Perry.

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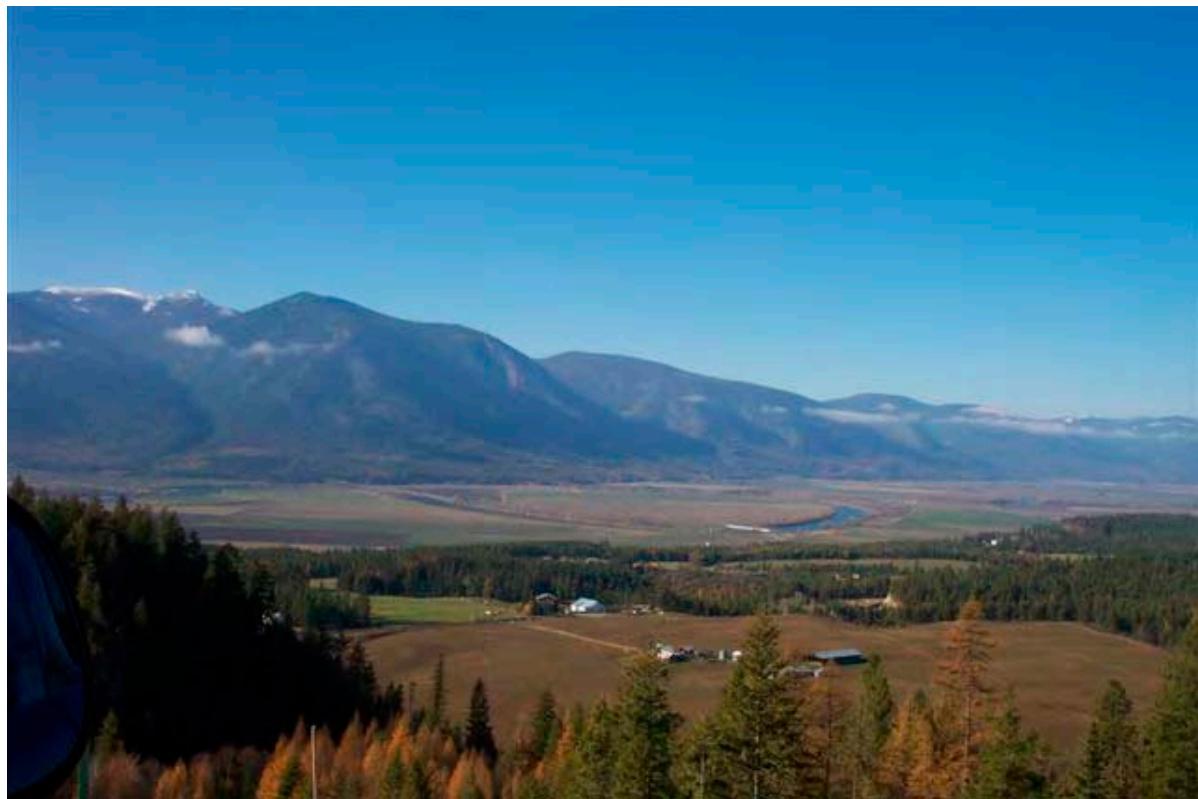


**Burton Peak. Photo by Nadine Nystrom.**

**May 2006**

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**Kootenai River Valley. Photo by Nadine Nystrom.**

## Acknowledgments

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This document was developed with the assistance of the Kootenai Watershed Advisory Group, also recognized as the Kootenai Valley Resource Initiative. The KVRI also formed a subcommittee to focus specifically on the TMDL Plan.

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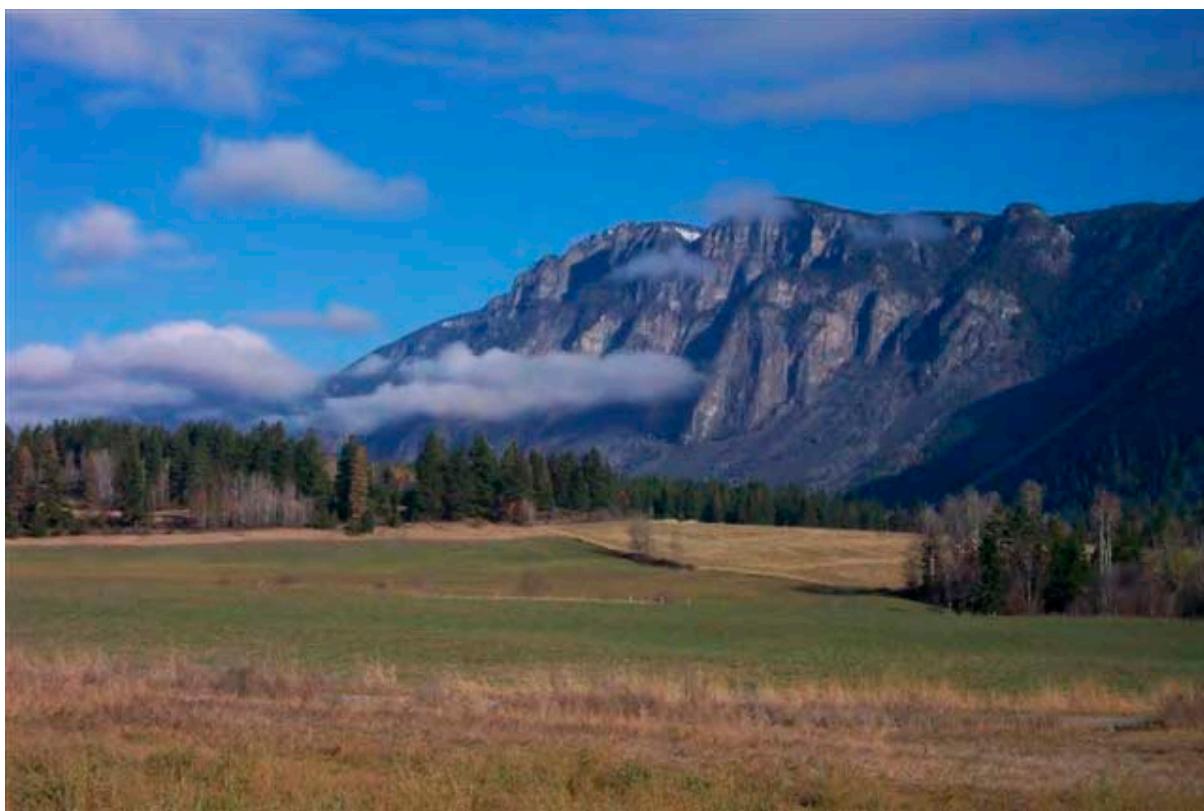
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**From Junction Hill looking north toward Port Hill. Photo by Nadine Nystrom.**

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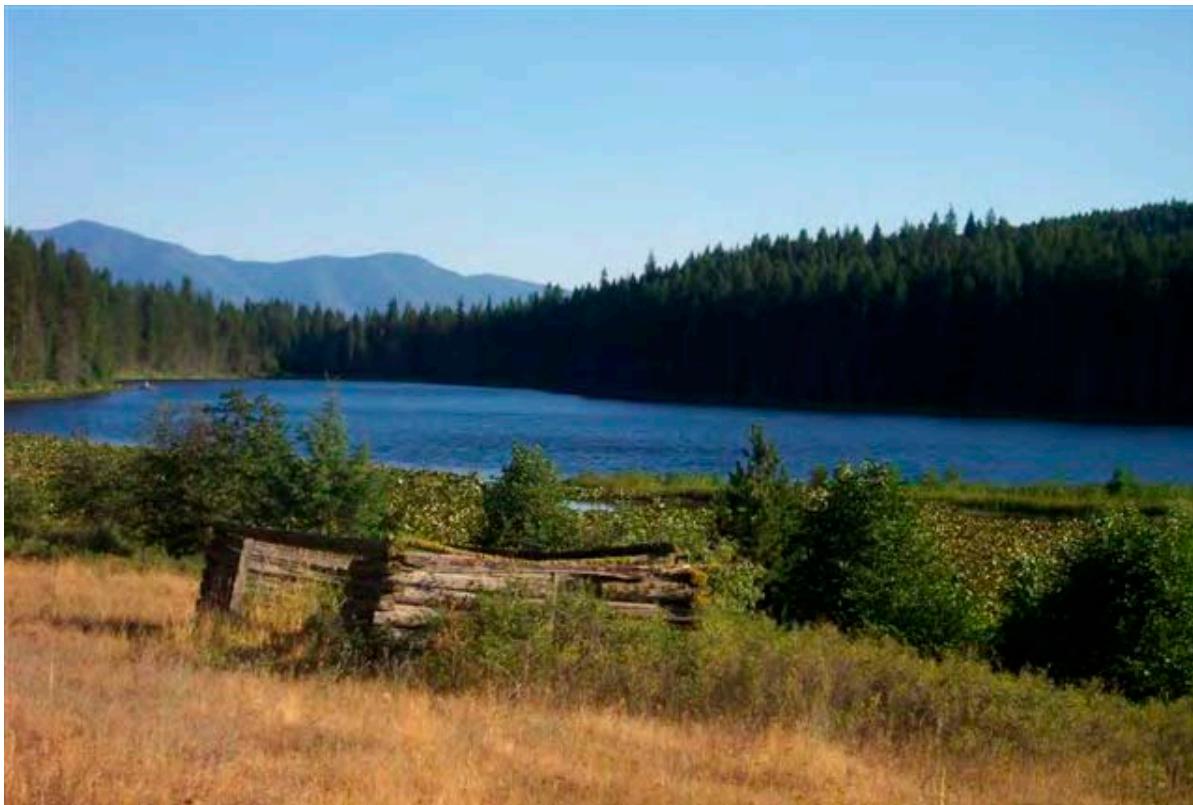
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**Dawson Lake. Photo by Nadine Nystrom.**

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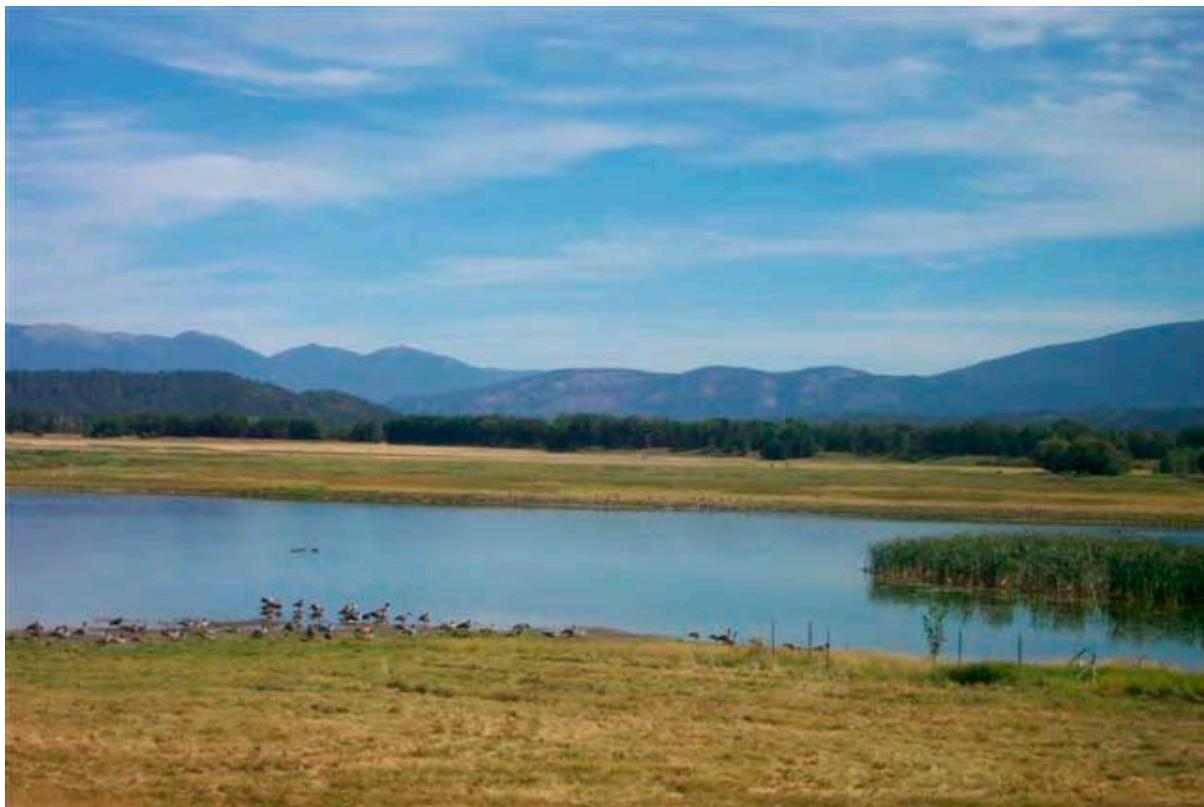
**Kootenai River from West Side Road. Photo by Nadine Nystrom.**

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**Kootenai National Wildlife Refuge. Photo by Nadine Nystrom.**

## Abbreviations, Acronyms, and Symbols

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<b>§303(d)</b>	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section	<b>cm</b>	centimeters
<b>µ</b>	micro, one-one thousandth	<b>CWA</b>	Clean Water Act
<b>§</b>	Section (usually a section of federal or state rules or statutes)	<b>CWAL</b>	cold water aquatic life
<b>ADB</b>	assessment database	<b>CWE</b>	cumulative watershed effects
<b>AU</b>	assessment unit	<b>DEQ</b>	Department of Environmental Quality
<b>AWS</b>	agricultural water supply	<b>DO</b>	dissolved oxygen
<b>BAG</b>	Basin Advisory Group	<b>DOI</b>	U.S. Department of the Interior
<b>BLM</b>	United States Bureau of Land Management	<b>DWS</b>	domestic water supply
<b>BMP</b>	best management practice	<b>EMAP</b>	Environmental Monitoring and Assessment Program
<b>BOD</b>	biochemical oxygen demand	<b>EPA</b>	United States Environmental Protection Agency
<b>BOR</b>	United States Bureau of Reclamation	<b>ESA</b>	Endangered Species Act
<b>Btu</b>	British thermal unit	<b>F</b>	Fahrenheit
<b>BURP</b>	Beneficial Use Reconnaissance Program	<b>FPA</b>	Idaho Forest Practices Act
<b>C</b>	Celsius	<b>FWS</b>	U.S. Fish and Wildlife Service
<b>CFR</b>	Code of Federal Regulations (refers to citations in the federal administrative rules)	<b>GIS</b>	Geographical Information Systems
<b>cfs</b>	cubic feet per second	<b>HUC</b>	Hydrologic Unit Code
		<b>I.C.</b>	Idaho Code
		<b>IDAPA</b>	Refers to citations of Idaho administrative rules
		<b>IDFG</b>	Idaho Department of Fish and Game

<b>IDL</b>	Idaho Department of Lands	<b>NB</b>	natural background
<b>IDWR</b>	Idaho Department of Water Resources	<b>nd</b>	no data (data not available)
<b>INFISH</b>	the federal Inland Native Fish Strategy	<b>NFS</b>	not fully supporting
<b>IRIS</b>	Integrated Risk Information System	<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>km</b>	kilometer	<b>NRCS</b>	Natural Resources Conservation Service
<b>km<sup>2</sup></b>	square kilometer	<b>NTU</b>	nephelometric turbidity unit
<b>LA</b>	load allocation	<b>ORV</b>	off-road vehicle
<b>LC</b>	load capacity	<b>ORW</b>	Outstanding Resource Water
<b>m</b>	meter	<b>PACFISH</b>	the federal Pacific Anadromous Fish Strategy
<b>m<sup>3</sup></b>	cubic meter	<b>PCR</b>	primary contact recreation
<b>mi</b>	mile	<b>PFC</b>	proper functioning condition
<b>mi<sup>2</sup></b>	square miles	<b>ppm</b>	part(s) per million
<b>MBI</b>	Macroinvertebrate Biotic Index	<b>PNV</b>	potential natural vegetation
<b>MGD</b>	million gallons per day	<b>QA</b>	quality assurance
<b>mg/L</b>	milligrams per liter	<b>QC</b>	quality control
<b>mm</b>	millimeter	<b>RBP</b>	rapid bioassessment protocol
<b>MOS</b>	margin of safety	<b>RDI</b>	DEQ's River Diatom Index
<b>MRCL</b>	multiresolution land cover	<b>RFI</b>	DEQ's River Fish Index
<b>MWMT</b>	maximum weekly maximum temperature	<b>RHCA</b>	riparian habitat conservation area
<b>n.a.</b>	not applicable	<b>RMI</b>	DEQ's River Macroinvertebrate Index
<b>NA</b>	not assessed	<b>RPI</b>	DEQ's River Physiochemical Index

<b>SBA</b>	subbasin assessment	<b>U.S.C.</b>	United States Code
<b>SCR</b>	secondary contact recreation	<b>USDA</b>	United States Department of Agriculture
<b>SFI</b>	DEQ's Stream Fish Index	<b>USDI</b>	United States Department of the Interior
<b>SHI</b>	DEQ's Stream Habitat Index	<b>USFS</b>	United States Forest Service
<b>SMI</b>	DEQ's Stream Macroinvertebrate Index	<b>USGS</b>	United States Geological Survey
<b>SRP</b>	soluble reactive phosphorus	<b>WAG</b>	Watershed Advisory Group
<b>SS</b>	salmonid spawning	<b>WBAG</b>	<i>Water Body Assessment Guidance</i>
<b>SSOC</b>	stream segment of concern	<b>WBID</b>	water body identification number
<b>STATSGO</b>	State Soil Geographic Database	<b>WET</b>	whole effluence toxicity
<b>TDG</b>	total dissolved gas	<b>WLA</b>	wasteload allocation
<b>TDS</b>	total dissolved solids	<b>WQLS</b>	water quality limited segment
<b>T&amp;E</b>	threatened and/or endangered species	<b>WQMP</b>	water quality management plan
<b>TIN</b>	total inorganic nitrogen	<b>WQRP</b>	water quality restoration plan
<b>TKN</b>	total Kjeldahl nitrogen	<b>WQS</b>	water quality standard
<b>TMDL</b>	total maximum daily load		
<b>TP</b>	total phosphorus		
<b>TS</b>	total solids		
<b>TSS</b>	total suspended solids		
<b>t/y</b>	tons per year		
<b>t/a/y</b>	tons per acre per year		
<b>U.S.</b>	United States		

## Executive Summary

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The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife, while providing for recreation in and on the nation's waters whenever possible. Subsection 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list (a “§303(d) list”) of impaired waters. Currently, this list must be published every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

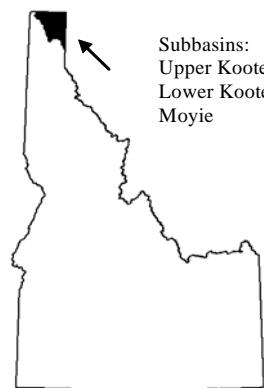
The Lower Kootenai and Moyie Rivers Subbasin Assessment (SBA) and TMDL have been developed for streams listed on the 1998 §303(d) list. The 2002 §303(d) list was approved by the Environmental Protection Agency (EPA) in December 2005 after this SBA and TMDL was substantially complete. When practical, information from the 2002 list is included in this document.

This SBA and TMDL analysis has been developed to comply with Idaho's TMDL schedule. The assessment describes the physical, biological, and cultural setting, water quality status, pollutant sources, and recent pollution control actions in the Lower Kootenai and Moyie River Subbasins, located in northeastern Idaho.

The first part of this document, the SBA, is an important first step in developing the TMDL. The starting point for this assessment was Idaho's 1998 §303(d) list of water quality limited water bodies. Seven segments of the Lower Kootenai and Moyie River Subbasins were included on this list. The SBA examines the current status of §303(d) listed waters and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The second part of this document, the TMDL analysis, quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

## Subbasin at a Glance

Subbasins:	Upper Kootenai (17010101, does not include any listed stream segments), Lower Kootenai (17010104), and Moyie (17010105)
Key Resource:	Aquatic Life and Habitat
Uses Affected:	Cold Water Aquatic Life, Salmonid Spawning
Pollutants:	Sediment Metals pH Temperature
Pollutant sources considered:	<b>Agriculture, Forest Practices, Roads, Railroads, Pipeline, Urbanization, and Natural background</b>



**Figure 1. Subbasin at a Glance.**

The Upper Kootenai River Subbasin (17010101) does not have any §303(d) listed stream segments in its Idaho portion, and most of the subbasin is in Montana, therefore, the Upper Kootenai River Subbasin will not be discussed often in this TMDL. The Lower Kootenai River Subbasin (17010104) is located at the very top of the panhandle of Idaho, bordering both Canada and Montana, with small portions in each. The Moyie River Subbasin (17010105) is in the very northeast corner of Idaho, also bordering both Canada and Montana, with small portions in each, and surrounded on the west and south by the Lower Kootenai River Subbasin. (Figure 18 on page 38 shows all three subbasins.)

- The **Kootenai River** flows west-northwest into Idaho from Libby, Montana, turns north after Bonners Ferry, and flows into Canada.
- The **Moyie River**, which first flows southward through the Moyie River Subbasin, joins the Kootenai River near Moyie Springs, after the Kootenai River has crossed from Montana into Idaho.

Deep Creek was originally listed on the 1998 Idaho §303(d) list of impaired waters for sediment pollution. Later, when EPA made additions to the 1998 Idaho §303(d) list for temperature pollution, Deep and Boundary Creeks were added (see Figure 2).

Deep Creek flows north through the Purcell Trench from the McArthur Lake area and joins the Kootenai River adjacent to the Kootenai National Wildlife Refuge. Deep Creek has its headwaters in the forest above McArthur Lake, and flows through a mix of deciduous/conifer vegetation types on predominantly private land along Highway 95. Deep Creek is likely to have experienced a variety of impacts over the years. From a stream temperature standpoint, it is important to note that Deep Creek receives much of its flow from McArthur Lake, a shallow, warm water lake.

Boundary Creek enters Idaho from Canada and flows east to the Kootenai River, re-entering Canada approximately three miles before it enters the Kootenai River. Boundary Creek appears to flow through mostly intact forest on national forest land with only some minor

clearing of timber at its lower end. Much of the Boundary Creek watershed is in Canada, thus land use activities and their effects on stream temperature outside of the U.S. are not under the purview of the state of Idaho.

In 2002, DEQ conducted additional assessments of streams in Idaho. Deep and Boundary Creeks were assessed at that time and found to be not supporting aquatic life uses (cold water and salmonid spawning). Deep Creek<sup>1</sup> had the sediment pollution listing from 1998 carried over into the 2002 assessment, and was also found to be thermally modified. Boundary Creek<sup>2</sup> was found to be impacted by metals pollution and thermal modification. The streams macroinvertebrate scores deviated from reference conditions and violations of temperature criteria recorded.

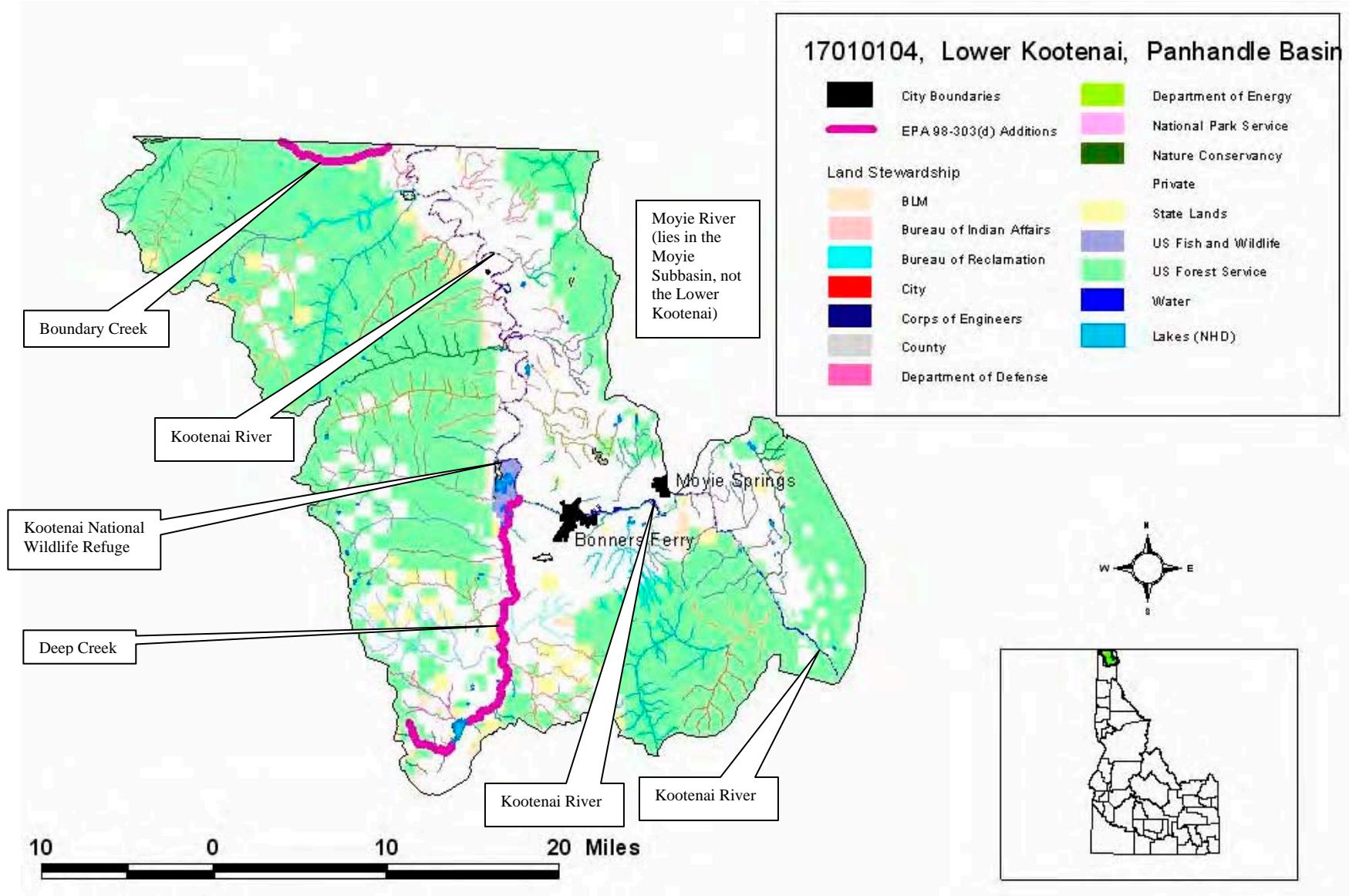
Air temperatures are in the Kootenai and Moyie Subbasins are related to elevation. Stream temperatures in turn are affected by the air temperature. The Kootenai and Moyie Subbasins are the lowest elevation, forested subbasins in the state. Indicators of ambient air temperature for Deep and Boundary Creeks are summarized in Figure 3 and Figure 4.

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<sup>1</sup> AU# ID17010104PN015\_04, ID17010104PN018\_04, ID17010104PN019\_04, and ID17010104PN022\_03

<sup>2</sup> AU# ID17010104PN002\_02 and ID17010104PN002\_03

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**Figure 2. Lower Kootenai River Subbasin details.**

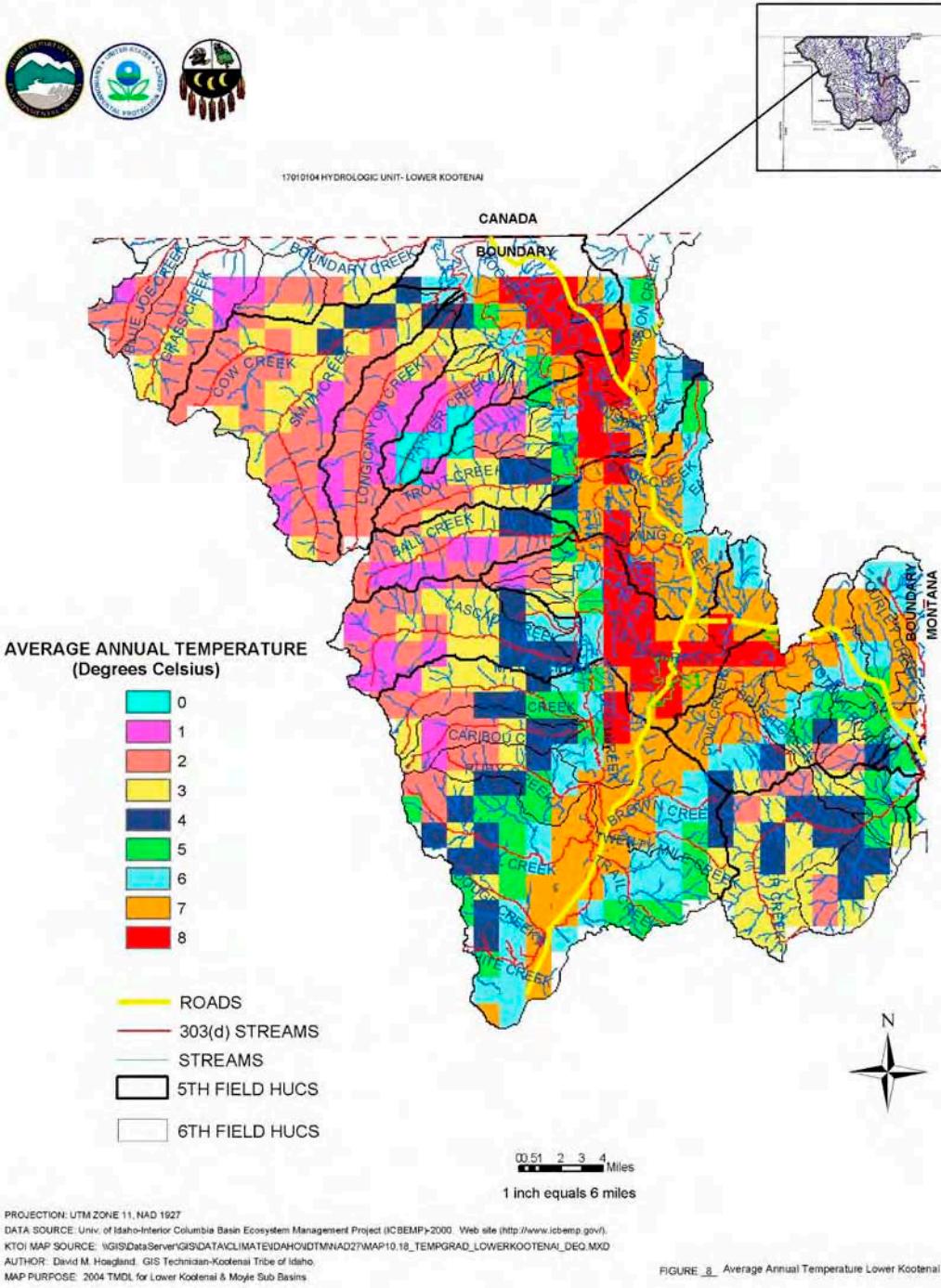


Figure 3. Average Annual Temperature for Lower Kootenai River Subbasin in 1989.

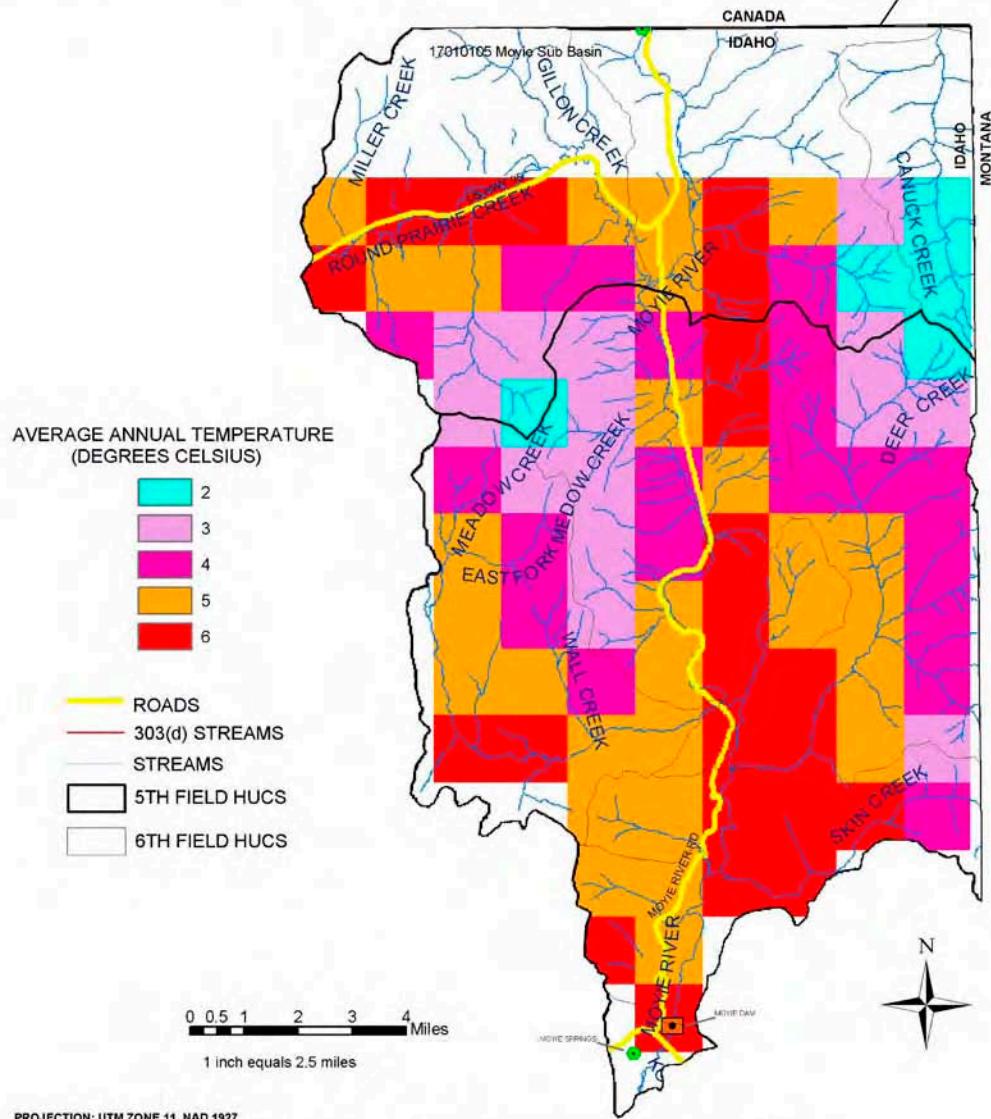
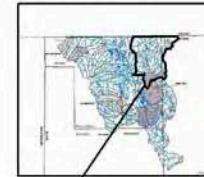


FIGURE 9 Average Annual Temperature of the Moyie Sub Basin

**Figure 4. Average Annual Temperature for Moyie River Subbasin in 1989.**

## Key Findings

The Lower Kootenai and Moyie watersheds remained in a relatively natural condition until the early twentieth century when miners, loggers, and ranchers began to settle in the area. The watershed has a history of timber harvest and some grazing, which, in recent years, has been restricted to the floodplain of the lower portion of the Kootenai River. In 1998, seven stream segments in the two subbasins were §303(d) listed for sediment, temperature, metals, and pH. Table E-1 shows the stream segments listed in 1998, along with the pollutants for which they were listed at that time. During the development of the Kootenai and Moyie SBA and TMDL the 1998 §303(d) list was the most recently EPA approved list.

In December 2005 EPA approved section 5 of the 2002 Integrated Report. Similar to the 1998 §303(d) list, section 5 of the 2002 Integrated Report is a requirement of the Clean Water Act, listing surface waters which are failing to meet surface water quality standards. Thirty four temperature, two unknown and one sediment additions were made to section 5 of the 2002 Integrated Report within the Lower Kootenai HUC in Idaho. Eleven temperature and one unknown additions were made to the Moyie HUC in Idaho. The Kootenai and Moyie rivers SBA and TMDL were developed using the 1998 §303(d) list.

**Table E-1. 1998 §303(d) listed streams and pollutants considered in Subbasin Assessment.**

Stream	Waterbody ID	Description	Pollutant(s)
Blue Joe Creek	ID17010104PN004_02	First and second order portion of Blue Joe Creek from headwaters to Idaho/Canadian border	Metals <sup>1</sup> , pH <sup>1</sup> , Sediment <sup>1</sup>
Boulder Creek	ID17010104PN032_03	Third order portion of Boulder Creek from East Fork Boulder Creek to mouth	Sediment <sup>1</sup>
	ID17010104PN033_02	First and second order portion of Boulder Creek from headwaters to East Fork Boulder Creek	
	ID17010104PN033_03	Third order portion of Boulder Creek from headwaters to East Fork Boulder Creek	
Boundary Creek	ID17010104PN002_02	First and second order portions of Boundary Creek from Idaho/Canadian border back to Canadian border, including main stem Boundary Creek to Fan Creek	Temperature <sup>2</sup>
	ID17010104PN002_03	Third Order portion of Boundary Creek main stem from Fan Creek to Canadian Border near Kootenai River	
Caribou Creek	ID17010104PN017_02	First and second order portions of Caribou Creek From Roman Nose Lakes to confluence with Deep Creek	Sediment <sup>1</sup>
Cow Creek	ID17010104PN006_02	First and second order portions of Cow Creek and Beaver Creek from headwaters to Cow Creek's confluence with Beaver Creek	Sediment <sup>1</sup>
	ID17010104PN006_03	Third order portion of Cow Creek downstream from confluence with Beaver Creek to Smith Creek	
Deep Creek	ID17010104PN025_02	First and second order portions of Deep Creek upstream of McArthur Lake	Temperature <sup>2</sup>
	ID17010104PN022_03	Third order portion of Deep Creek from McArthur Lake to Trail Creek	Sediment <sup>1</sup> , Temperature <sup>2</sup>
	ID17010104PN019_04	Fourth order portion of Deep Creek from Trail Creek to Twentymile Creek	

<b>Stream</b>	<b>Waterbody ID</b>	<b>Description</b>	<b>Pollutant(s)</b>
	ID17010104PN018_04	Fourth order portion of Deep Creek from Twentymile Creek to Snow Creek	
	ID17010104PN015_04	Fourth order portion of Deep Creek from Snow Creek to Kootenai River	
Moyie River	ID17010105PN001_05	Fifth order portion of Moyie River from Moyie River Dam to Kootenai River	Sediment <sup>1</sup>

1 – 1998 §303(d) List (DEQ 1998)

2 – EPA's Additions to the 1998 Idaho §303(d) List (EPA 1998)

Six of the seven streams were listed for sediment, two for temperature, and one for metals and pH. The sediment in the subbasin is primarily from road crossings and encroachment. Temperature is most affected by stream shading. Metals and pH exceedances stem from historic mining activity near the headwaters of Blue Joe Creek.

Impairment of cold water use was commonly assessed using composite scores of fish, macroinvertebrate, and habitat indices. These scores generally indicate full support of beneficial uses in most streams assessed in the subbasin, but they also indicate use impairment in some tributaries to the Kootenai River. Monitoring stations on Blue Joe Creek, Boulder Creek, Caribou Creek, Cow Creek, and Deep Creek had index scores below the threshold of full support during the 1998 assessment. Deep Creek and Boundary Creek had temperatures exceeding Idaho's Water Quality Criteria. The Kootenai River itself was not §303(d) listed nor was it found to be impaired in the 1998 assessment.

Water temperatures are an issue in the Lower Kootenai and Moyie Subbasins. An SBA and TMDL for water temperatures was developed in 2005, however, before the temperature SBA/TMDL was completed, the Kootenai and Moyie River Basin Watershed Advisory Group decided they could support the approach and suggested to incorporate it into this TMDL which initially addressed only sediment, plus metals and pH for Blue Joe Creek. (The working title of the temperature SBA and TMDL was *Boundary Creek and Deep Creek Temperature Total Maximum Daily Loads: Addendum to the Lower Kootenai River Subbasin Assessment and TMDL*.) Additionally, an assessment of temperature data in 2002 indicates that all monitored streams in the Lower Kootenai and Moyie Subbasins exceed Idaho temperature criteria. In a situation where all streams, including un-disrupted streams, have numeric criteria exceedances, a special look at natural conditions must be taken into account. The Lower Kootenai and Moyie watersheds are located in the northern most portion of Idaho at relatively low elevations. Throughout the state it has been demonstrated that water temperatures are most strongly affected by air temperatures which directly relate to elevation. The Lower Kootenai and Moyie Subbasins are the lowest-elevation forested subbasins in the state. Future SBAs and TMDLs will need to address watershed-wide natural conditions, temperature targets, and acceptable temperature loading.

Metals and pH are identified as pollutants for Blue Joe Creek. At the time of the 1998 assessment, Blue Joe Creek was void of aquatic insect life and was impaired. The source of metals and associated pH issues is the now abandoned Continental Mine. Through environmental cleanup activities, both the Idaho Department of Environmental Quality Remediation Section and the USDA Forest Service have been actively reducing metals and pH loading over the last three years. All reasonable TMDL implementation activities for

metals and pH loading are complete, and Blue Joe Creek is in a state of recovery. Aquatic insects have started to re-occupy Blue Joe Creek, and it is reasonable to assume that through the combination of remediation activities that have occurred and future sediment reduction efforts that Blue Joe Creek will be fully supporting all beneficial uses within the decade.

The 1998 §303(d) list includes the Moyie River, from the Moyie River Dam to its confluence with the Kootenai River. Excess sediment is the listed pollutant, and based on the 1998 determination, a TMDL would be required. DEQ does not have Beneficial Use Reconnaissance (BURP) monitoring data on this section of Moyie River, and believes the sediment listing decision was based on anecdotal understandings and information. DEQ has evidence that the listing resulted from a single fine sediment deposition event and that the stream has recovered since that event and therefore recommends delisting.

Three of the listed streams; Blue Joe Creek, Boulder Creek and Caribou Creek have been removed as candidates for sediment TMDL development, for the following reasons:

- Draft TMDLs demonstrated that current sediment generating conditions are better than those showing full support of the beneficial uses.
- The listings were based on 1995 BURP data that are contrary to data collected more recently.
- Stressor Identification Analysis (EPA 2000) performed by DEQ supports removal of these three streams as TMDL candidates.

After further analysis of available data, changes needed in the 1998 §303(d) list were apparent. Table E-2 shows delisting recommendations and the rationale for each.

**Table E-2. Summary of assessment outcomes, including delisting recommendations.**

Stream	Water Body Segment/ AU	Pollutant	TMDL(s) Completed	Recommended Changes to §303(d) List	Justification
Blue Joe Creek	ID17010104PN004_02	Metals	No	Category 4b candidate <sup>1</sup>	Remediation in progress
Blue Joe Creek	ID17010104PN004_02	pH	No	Category 4b candidate <sup>1</sup>	Remediation in progress
Blue Joe Creek	ID17010104PN004_02	Sediment	No	Delist <sup>2</sup>	Current load less than target
Boulder Creek	ID17010104PN032_03	Sediment	No	Delist <sup>2</sup>	Current load less than target
Boulder Creek	ID17010104PN033_02	Sediment	No	Delist <sup>2</sup>	Current load less than target
Boulder Creek	ID17010104PN033_03	Sediment	No	Delist <sup>2</sup>	Current load less than target
Boundary Creek	ID17010104PN002_02	Temperature	Yes	None	NA <sup>3</sup>
Boundary Creek	ID17010104PN002_03	Temperature	Yes	None	NA
Caribou Creek	ID17010104PN017_02	Sediment	No	Delist <sup>2, 4</sup>	Current load less than target
Cow Creek	ID17010104PN006_02	Sediment	Yes	None	NA

<b>Stream</b>	<b>Water Body Segment/AU</b>	<b>Pollutant</b>	<b>TMDL(s) Completed</b>	<b>Recommended Changes to §303(d) List</b>	<b>Justification</b>
Cow Creek	ID17010104PN006_03	Sediment	Yes	None	NA
Deep Creek	ID17010104PN025_02	Temperature	Yes	None	NA
Deep Creek	ID17010104PN022_03	Sediment	Yes	None	NA
Deep Creek	ID17010104PN019_04	Sediment	Yes	None	NA
Deep Creek	ID17010104PN018_04	Sediment	Yes	None	NA
Deep Creek	ID17010104PN015_04	Sediment	Yes	None	NA
Deep Creek	ID17010104PN022_03	Temperature	Yes	None	NA
Deep Creek	ID17010104PN019_04	Temperature	Yes	None	NA
Deep Creek	ID17010104PN018_04	Temperature	Yes	None	NA
Deep Creek	ID17010104PN015_04	Temperature	Yes	None	NA
Moyie River	ID17010105PN001_05	Sediment	No	Delist	Impairment was based on a single event <sup>5</sup>

1. Category 4b contains a list of waterbodies which have water quality improvement projects currently in place.
2. Stressor Identification Assessment (EPA. 2000) performed supports removal of sediment as pollutant.
3. Not Applicable.
4. Caribou Creek within boundary of Deep Creek TMDL.
5. See photos in section 1.2.4.8.

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